CLAIMS :

1. A dental shade measuring device comprising:

- illumination means (24, 40, 42, 44, 48, 50), for successively illuminating at least one part of a tooth (D) with light of various spectral ranges,
- at least one monochrome sensor (26) sensitive to intensity of light coming from said tooth part, in response to the illumination, to generate for each different color of illumination, at least one measurement signal,
- means (30, 32) for converting the measurement signals corresponding to said tooth part, into coordinates of a measurement point (202), in a shade space in which "reference" points (320, 410, 540) are also defined, corresponding to the preset shades of a dental shade guide, and
- automatic shade search means (14) for automatically searching a shade corresponding to the reference point closest to the measurement point, in the shade space, for said tooth part.

2. A device according to claim 1, wherein the illumination means comprise substantially monochrome light sources (40, 40a, 40n, 40r, 40g, 40b).

3. A device according to claim 2, wherein the light sources are cold sources.

4. A device according to claim 3, wherein the light sources comprise electroluminescent diodes or laser diodes, centered on the colors red, green, blue, yellow and orange.

5. A device according to claim 1, wherein the illumination means (40) comprise sources of visible light and at least one source of ultraviolet light.

6. A device according to claim 1, wherein the illumination means (40) comprise sources of visible light and at least one source of infrared light.

7. A device according to claim 1, with:

- a measuring instrument (10) comprising the illumination means and the sensor, and
- a measurement exploitation terminal (12), remote from the measuring instrument, forming the shade search means.

8. A device according to claim 7, wherein the measuring instrument (10) is linked to the terminal (12) by a link selected from among: an electrical link, an optical link and a Hertzian link.

9. A device according to claim 1, wherein the sensor (26) is a photodiode light sensor.

10. A device according to claim 1, wherein the sensor (26) is an image sensor with a plurality of pixels.

11. A measuring instrument (10) for a device according to claim 1, comprising the sensor (26) and an illumination head (22) provided with a plurality of light emitting sites (24) linked to the light sources.

12. An instrument according to claim 11, wherein the sensor (26) is housed in the illumination head (22) and wherein the light emitting sites (24) are arranged around the sensor.

13. An instrument according to claim 11, wherein the light emitting sites (24) are coupled with light sources by means of optical fibers (28).

14. A measuring instrument according to claim 13, wherein all the light emitting sites (24) are coupled in common to a set of light sources (40), to emit simultaneously light of the same spectral range, when at least one light source is activated.

15. A measuring instrument according to claim 11, comprising a plurality of subassemblies of light emitting sites (24a, 24b), each subassembly of light emitting sites being coupled respectively to a light source (40a, 40b) taken among a plurality of light sources of various spectral ranges, so that the light emitting sites of each subassembly simultaneously emit light of the same spectral range, the light emitting sites of each subassembly being distributed substantially regularly around the sensor.

16. A measuring instrument according to claim 11, wherein the light emitting sites are the free ends (50) of a bundle of optical fibers, coupled to the light sources.

17. A measuring instrument according to claim 11, comprising a grip (20) housing at least one from among: a set of light sources (40), the signal conversion means (30, 32), and a data transmission interface (34), and in which the illumination head (22) is mounted in a removable way on the grip.

18. A measuring instrument according to claim 11, comprising a first shield (62) opaque to the illumination light, held close to the illumination head to be able to insert a tooth between the illumination head and the shield.

19. A measuring instrument according to claim 11, comprising a second shield (60) solid with the illumination head (22) and surrounding the light emitting sites, to prevent ambient light from directly reaching an illuminated tooth part, when the illumination head is applied to a tooth.

20. A measuring instrument according to claim 11, comprising a means (28) for forming an image on the sensor.

21. A dental shade measuring method comprising:

- the illumination of at least one tooth part, successively with stimulated illumination light, with various spectral ranges,

- the reception of light coming from the tooth part, in response to each stimulated illumination, and the formation of a measurement signal of said light,

- the establishment, according to the measurement signal, of the coordinates (200) of a measurement point in a shade space, in which reference points (320, 410, 540, B4, D3, D4) are also defined corresponding to the preset shades of a dental shade guide, and

- the search, for the tooth part, of a shade corresponding to a reference point closest to the measurement point, in the shade space.

22. A method according to claim 21, comprising the illumination of the tooth part with a plurality of sources of visible light and one source of infrared light.

23. A method according to claim 22, comprising the establishment, in response to the illumination of the tooth part with infrared light, of a transparency value of said tooth part.

24. A method according to claim 23, comprising the correction of at least one coordinate of the measurement point (200) according to the transparency value of the tooth part.

25. A method according to claim 21, comprising the illumination of the tooth part with a plurality of sources of visible light and one source of ultraviolet light and the establishment, according to the light collected in

response to the illumination of the tooth part with the ultraviolet light, of a roughness parameter (166) of the tooth part.

26. A method according to claim 21, comprising: the use of a sensor with a plurality of pixels, to collect the light from a plurality of selected tooth parts, and the establishment of an average shade for the selected tooth parts, the average shade being weighted by the roughness parameter of each selected tooth part.

27. A method according to claim 21, also comprising the reception (160) of light from the tooth part, in the absence of the stimulated illumination, and the establishment of the coordinates of the measuring point according to the gap between the light received in the presence and in the absence of the stimulated illumination light.

28. A method according to claim 21, also comprising the direct reception of part of the stimulated illumination light, and the correction of at least one from among: the coordinates of the measuring point, and a power supply of a source of stimulated illumination light, according to said direct reception of the stimulated illumination light.

29. A method according to claim 21, comprising reception of the light from the tooth part illuminated through a transparent substance (66), in liquid or gel form, applied to the tooth part.

30. A method according to claim 21, also comprising the establishment of the length and direction of a correction vector (203, 204) of the shade space, defined by the measurement point and the reference point linked to the tooth part, and the indication to a user of the reference shade corresponding to the tooth part, together with shade correction data according to at least one from among the direction and the length of the correction vector.

31. A method according to claim 21, comprising the illumination of a whole tooth, the establishment of tooth shades of parts of said tooth, and the preparation of a map of shades corresponding to the whole tooth.